



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,985	08/26/2003	Patricia Beauregard Smith	TI-33260	3087

23494 7590 01/10/2008
TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER

EL ARINI, ZEINAB

ART UNIT	PAPER NUMBER
----------	--------------

1792

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

01/10/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com
uspto@dlemail.itg.ti.com

Office Action Summary

Application No.

10/647,985

Applicant(s)

SMITH ET AL.

Examiner

Zeinab E. EL-Arini

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-15, 17, 18 and 20-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-15, 17-18, and 20-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The amendment and remarks filed on 10/26/07 have been acknowledged and entered.

The rejection under 35 USC 102(b) as anticipated by Chang, stated in paper No. 20070620 has been withdrawn in view of applicants' amendment.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 8-9, 11-12, 15, 18, and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (5,643,407).

Re. claims 1, 8, 21-23, Chang discloses a method of forming the intermetal dielectric layer of an integrated circuit. The reference teaches the patterning step (col. 2, line 45-col. 3, line 17), the wet cleaning step and the annealing step (col. 3, lines 18-37). Re. claims 9, 11, 12 and 21, see col. 3, lines 44-47; and claim 1, 5. Re. claim 15, it is inherent in the Chang process. Re. claim 18, see col. 2, lines 55-57.

Chang discloses the claimed invention except for the anneal duration as claimed. It would have been obvious to a person having ordinary skill in the art at the time the invention was made to adjust the anneal duration to obtain optimum results, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See

also *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955). This is also because the time for annealing depends on the amount of moisture to be removed from the surface.

1. Claims 5-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang' 407 in combination with Nguyen et al. (2003/0104320).

Chang' 407 as discussed supra does not teach dry cleaning (using plasma) before cleaning the polymer residue.

Nguyen et al. disclose that the conventional photoresist removal sequence typically consists of combination of a dry strip process using oxygen to remove the bulk of the photoresist layer and a wet clean process to remove the residues and metal contaminants, and the conventional sequence further includes an anneal step to remove any moisture resulting from the wet strip. See paragraph 7.

It would have been obvious for one skilled in the art to use the plasma cleaning before the wet cleaning in Chang' 407 process, because it is well known in the conventional photoresist removal sequence. Re. claim 17, the metal deposit in Chang' 407 may include copper.

2. Claims 2-4, 10, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang' 407 in combination with Nguyen et al. (2003/0104320) as applied to claims 5-6 and 17 above, and further in view of Chang et al. (2003/0008518), Chiu et al. (6,107,202), and Akino et al. (6,417,108).

Re. claim 2, see Chang et al, claims 4 and 14.

Re. claim 4, see Chiu et al, col. 8, last line.

Re. claim 10, one skilled in the art would adjust the anneal temperature to obtain optimum results. Re. claims 13 and 14, one skilled in the art would adjust the time to obtain optimum results. This is also because the time for annealing depends on the amount of moisture to be removed from the surface.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to adjust the anneal duration and temperature to obtain optimum results, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955).

Re claim 3, it is well known in the art to use acid in wet cleaning wafer. See Akino et al., col. 6, lines 30-31.

It would have been obvious for one skilled in the art to use the solvent taught by Chiu et al. and the acid taught by Akino et al. in the Chang' 407 process to improve the cleaning process. One skilled in the art would use the dielectric layer taught by Chang et al' 518 in the Chang' 407 process because the dielectric layer in both references are equivalent.

3. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (2002/0058397).

Smith et al. teach a method of fabricating an electronic device. The reference discloses performing plasma strip, wet cleaning, low pressure anneal, fluorine based

solvent as claimed. See claims 1-5, 30-31, and paragraph 24, lines 12-15. The acid, see pages 25 and 27.

The reference does not teach the temperature, and the anneal duration as claimed.

It would have been obvious for one skilled in the art to use the process taught by Smith et al. to remove volatile cleaner compounds from a post-etch substrate as claimed. This is because it would have been obvious to a person having ordinary skill in the art at the time the invention was made to adjust the anneal duration and temperature to obtain optimum results and to improve the cleaning process, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See also *In re Aller*, 220 F.2d 454, 105 USPQ 223 (CCPA 1955).

Response to Arguments

4. Applicant's arguments with respect to claims 1-6, 8-15, 17-18, and 20-23 have been considered but are moot in view of the new ground(s) of rejection, and for the reason set forth in this office action.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeinab E. EL-Arini whose telephone number is 571-272-1301. The examiner can normally be reached on Monday.-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571-272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Zeinab E. EL-Arini
Zeinab E EL-Arini
Primary Examiner
Art Unit 1792

ZEE
12/26/07